

# Examination Regulations

for

## Electrical and Electronics Engineering B.Sc.

at Rhine-Waal University of Applied Sciences

Dated 9 January 2018

*Translator's note: This English translation is offered for information purposes only and as a service of Rhine-Waal University of Applied Sciences.*

*Every effort has been made to render a true and authentic translation. Nevertheless, due to the legal nature of this document, only the original German-language versions published in the Official Notices of Rhine-Waal University of Applied Sciences are considered legally binding in the Federal Republic of Germany.*

*In the event of any discrepancy or doubt between the German original and this English translation, the German version takes precedence.*

### Table of Contents

Section 1	Scope of Application
Section 2	Objectives, bachelor's examination, degree awarded
Section 3	Admission requirements
Section 4	Basic internship
Section 5	Curriculum, workload, progression of studies
Section 6	Practical semester, study abroad semester
Section 7	Scope of examinations
Section 8	Scope and form of the thesis
Section 9	Admission to the thesis and colloquium
Section 10	Credit values of the thesis and colloquium
Section 11	Conferral of the degree
Section 12	Entry into Force
Annex 1	Recommended study and examination plan (full time)
Annex 2	Recommended study and examination plan (dual)

## **Section 1 Scope of Application**

These examination regulations shall apply to the bachelor's degree programme Electrical and Electronics Engineering, offered in English by the Faculty of Technology and Bionics at Rhine-Waal University of Applied Sciences, in conjunction with the General Examination Regulations ("RPO") of Rhine-Waal University of Applied Sciences. These examination regulations govern both the standard seven-semester mode of study (full-time) as well as the dual-vocational nine-semester mode of study (dual).

## **Section 2 Objectives, bachelor's examination, degree awarded**

(1) The bachelor's examination concludes this degree programme and provides a first career qualification. The objectives for bachelor's degree programmes are outlined in Section 2 RPO. A strong command of the English language is essential for achieving success in this degree programme, as it provides the basis for the continuous broadening and deepening of students' technical language and communication skills over the course of their studies.

(2) The academic degree "Bachelor of Science", abbreviated as "B.Sc.", shall be awarded for the successful completion of the bachelor's examination.

## **Section 3 Admission requirements**

(1) General admission requirements are defined in Section 4 RPO.

(2) Admission on a dual study basis requires an additional vocational training contract in a related field.

(3) A "related or comparable programme of study" within the meaning of Section 4 (6) RPO is defined as any undergraduate (bachelor's or German *Diplom*) degree programme at a university or university of applied sciences, whose contents pertain significantly to the field of mechanical engineering.

(4) Sufficient proficiency in English is generally demonstrated via a recognised language certificate for the B2 level in accordance with the Common European Framework of Reference for Languages (CEF).

(5) Exempted from this language certificate requirement are applicants who have acquired English language proficiency equivalent to level B2 over the course of obtaining their general or subject-linked university entrance qualification. This is considered to be the case if an applicant has successfully completed at least seven years of English in the German school system and earned a final cumulative grade of "sufficient" or better (a "4" or less on the German grading scale) for the subject of English.

(6) Admission requirements for applicants with a university entrance qualification obtained in a non-EU country ("international students") are regulated by the Entrance Examination Regulations for International Students for Electrical and Electronics Engineering B.Sc. at Rhine-Waal University of Applied Sciences dated 9 January 2018.

## **Section 4 Basic internship**

- (1) The basic internship within the meaning of Section 4 (3) RPO should be completed at an extramural company, public authority or other organisation and in a context relevant to the curriculum such that students are exposed to questions and matters relating to materials science, engineering, professional organisations and business management.
- (2) The requirements for the expected fields of activity in the basic internship can be found in the Internship Regulations for Biomaterials Science B.Sc. of the Faculty of Technology and Bionics of Rhine-Waal University of Applied Sciences.

## **Section 5 Curriculum, workload, progression of studies**

- (1) The workload for this degree programme averages a total sum of 134 hours of weekly instruction (SWS).
- (2) In accordance with Section 6 (5) RPO, the modules of this programme comprise a total sum of 210 ECTS credit points ("credits").
- (3) The dual study arrangement consists of integrated, on-the-job vocational training at an extramural company over the first four semesters of study. Both the vocational training position and the company itself must clearly relevant to the student's field of study. The Faculty of Technology and Bionics is responsible for decisions concerning said relevance. In the dual phase of study, the content of the first two full-time semesters is instead taught over the course of four semesters. During this time, students spend two weekdays at the University and three weekdays training at the company. This phase concludes with a comprehensive examination at the German Chamber of Industry and Commerce or the Chamber of Trades before commencing the fifth semester of study.
- (4) Additional information about the progression of studies for this programme, as well as about the type, form and scope of modules, can be found in the study and examination plans in the annex. For details about a module's qualification aims, content and examination formats, please refer to module guide, which is available in the dean's office for all students and staff to view.
- (5) The following credit restrictions apply within this degree programme:
  - (a) 53 credits must be obtained from the modules listed in the first two semesters of study per the study and examination plan in order to register for examinations from the fourth semester onwards. This restriction does not apply to the foreign language elective module.
  - (b) 63 credits must be obtained via modules listed in the first two semesters of study per the study and examination plan in order to register for examinations from the fifth semester onwards. This restriction does not apply to the foreign language elective module.
  - (c) The credit point restrictions for requests to undertake the practical semester or the study abroad semester remain unaffected.
- (6) For the foreign language elective module, students whose native language is not German should complete a German course. Students whose native tongue is German may complete any other foreign language course offered.

## **Section 6**

### **Practical semester, study abroad semester**

- (1) In accordance with Section 21 (4) Sentence 4 RPO, assistance with securing an internship (Section 21 (4) Sentence 1 RPO) as well as the option of an applied research project at the University in place of an internship (Section 21 (4) Sentences 2 and 3 RPO) are excluded for students in this degree programme.
- (2) Deviating from Section 22 (5) and (7) RPO, study abroad semesters are subject to the following requirements. Students must obtain at least 30 credits or the full-time equivalent of the hosting university. The study abroad semester cannot be recognised in full unless students submit official documentation from the hosting university proving that 30 credits (or the full-time equivalent) were successfully obtained. Students who obtain fewer than 30, but at least 15 credits at the hosting university must make up the difference in missing credits via additional modules at Rhine-Waal University of Applied Sciences for full recognition of the study abroad semester (equal to 30 credits).
- (3) A study abroad semester is considered failed if fewer than 15 credits were obtained.
- (4) The courses to be completed at the hosting university must be coordinated with an examiner named in the module guide and documented in a Learning Agreement before commencing the study abroad semester.
- (5) If a student is unable to adhere to the Learning Agreement for reasons out of his or her control, said student must notify the Examination Board immediately to revise the existing Learning Agreement. In justified cases and where students do not comply with this obligation to notify, the Examination Board can decide on the recognition of credits for courses not included in the Learning Agreement.

## **Section 7**

### **Scope of examinations**

- (1) The time allotted to students for written examinations is based on the credit value of the corresponding course. As a general rule, 30 minutes shall be allotted for one credit point, not to exceed a total of two hours.
- (2) An oral examination is generally at least 30, but no more than 45 minutes in length.
- (3) Assignments, term papers or projects should generally not exceed 10,000 words (approx. 30 DIN A4 pages).

## **Section 8**

### **Scope and form of the thesis**

- (1) The text portion of the thesis should generally be between 15,000 words (approx. 50 DIN A4 pages) and 25,000 words (approx. 70 DIN A4 pages). The text portion may also be supplemented with other media, provided these contribute to the documentation of the work in appropriate and useful ways in accordance with the task. In this case, deviations from the minimum requirements for the scope of the text portion are permissible.

(2) The thesis can also be permitted in the form of group work if each student's individual contribution meets the requirements in Section 23 (1) RPO and is clearly distinguishable and thus assessable due to clear delimitation by section, page numbers or other criteria which ensure the clear delimitation of individual contributions.

### **Section 9 Admission to the thesis and colloquium**

(1) In addition to the requirements for admission to the thesis in Section 24 (1) RPO, students must have obtained 175 credits.

(2) In addition to the requirements for admission to the colloquium in Section 27 (2) RPO, students have obtained 207 credits.

### **Section 10 Credit values of the thesis and colloquium**

(1) Twelve credits shall be awarded for successfully completing the thesis.

(2) Three credits shall be awarded for successfully completing the colloquium.

### **Section 11 Conferral of the degree**

The bachelor's degree specified in Section 2 (2) is officially conferred upon issuing of the bachelor's degree certificate (Section 30 (1) RPO).

### **Section 12 Entry into Force**

(1) These examination regulations shall enter into force on the day after their publication in the Official Notices of Rhine-Waal University of Applied Sciences. They shall apply to students who were first enrolled in Electrical and Electronics Engineering B.Sc. in the Faculty of Technology and Bionics of Rhine-Waal University of Applied Sciences in or after winter semester 2017/18.

(2) Students who commenced their studies in Electronics B.Sc. prior to the aforementioned semester may continue their studies according to the examination regulations dated 29 August 2013 (published in the Official Notices on 25 September 2013) until no later than 28 February 2022.

(3) Students who are currently studying according to the examination regulations dated 29 August 2013 may submit a written request to the Examination Board to adopt the present version of the examination regulations for the remainder of their studies. The Examination Board shall decide on the recognition of examinations completed under the examination regulations dated 29 August 2013.

This document was issued on the basis of the resolution of 14 February 2018 of the Faculty Council of the Faculty of Technology and Bionics of Rhine-Waal University of Applied Sciences.

Notice: These Examination Regulations entered into force from on 27 April 2018.

Curriculum EL (FT)		HPW	Type						Examination form		CP	HPW						
			V	SL	S	Ü	Pra	Pro	Attestation	graded		WS1	SS2	WS3	SS4	WS5	SS6	WS7
<b>1st Semester</b>																		
EL 1 2000	Introductory Mathematics	8	5			3				x	8	8						
EL 1 2008	Statics and Strength of Materials	4	2			2				x	5	4						
EL 1 2011	Programming	4	2				2			x	5	4						
EL 1 2013	Business Economics and Project Management	4	3					1		x	5	4						
EL 1 2300	Introduction to Electrical Engineering	3	2		1					x	3	3						
EL 1 2301	Electrical Engineering I	4	2			1	1			x	5	4						
<b>2nd Semester</b>																		
EL 2 2001	Applied Mathematics	8	5			3				x	7	8						
EL 2 2003	Physics	4	2			1	1			x	5	4						
EL 2 2012	Advanced Programming	4	2				2			x	5	4						
EL 2 2302	Electrical Engineering II	4	2			1	1			x	5	4						
EL 2 2303	Digital Electronics	4	2			1	1			x	5	4						
EL 2 2304	Analog Electronics	4	2			1	1			x	5	4						
<b>3rd Semester</b>																		
EL 3 2014	Cross-Cultural Management and Creativity	4	2			2				x	5		4					
EL 3 2306	Microcontrollers	4	2				2			x	5		4					
EL 3 2307	Fields and Waves	4	2			2				x	5		4					
EL 3 2308	Signal Transmission	4	2			1	1			x	5		4					
EL 3 2309	Object-oriented Programming	4	2				2			x	5		4					
EL 3 2301	Drives and Power Electronics	4	2			2				x	5		4					
<b>4th Semester</b>																		
EL 4 2323	Materials and Manufacturing of Electronics	4	3			1				x	5		4					
EL 4 2311	Embedded Systems	4	2				2			x	5		4					
EL 4 2310	Signal Processing & Measurement Technology	4	1			1	2			x	5		4					
EL 4 2902	System Theory and Controls	4	2			1	1			x	5		4					
<b>Focus Field (see: Catalogue Individual Subjects: Focus Field Subjects)</b>																		
Focus Field Subject 1																		
Focus Field Subject 2																		
<b>5th Semester</b>																		
EL 5 2015	Group Project	1						1		x	5				1			
EL 5 2312	Microelectronic Control Systems	4	2				2			x	5				4			
EL 5 2313	Model-based Hardware Design	4	2			1	1			x	5				4			
EL 5 2314	Practical Electronics	4	2				2			x	5				4			
<b>Focus Field (see: Catalogue Individual Subjects: Focus Field Subjects)</b>																		
Focus Field Subject 3																		
Focus Field Subject 4																		
<b>6th Semester</b>																		
EL 6 2016	Internship / Semester abroad									x	30							
<b>7th Semester</b>																		
EL 7 2017	Thesis									x	12							
EL 7 2018	Colloquium									x	3							
EL 7 2510	Technology and Innovation Management	4	2				2			x	5					4		
EL 7 2512	Entrepreneurship	2						2		x	2					2		
Elective (see: Catalogue of Individual Subjects: Electives)																		
3																		
<b>Overview</b>		133	V	SL	S	Ü	Pra	Pro	Examination form		CP	WS1	SS2	WS3	SS4	WS5	SS6	WS7

Catalogue Individual Subjects EL		HPW	Type						Examination form		CP	HPW						
			V	SL	S	Ü	Pra	Pro	Attestation	graded		WS1	SS2	WS3	SS4	WS5	SS6	WS7
<b>Focus Field Subjects */*/*/*/*/*/*/*</b>																		
<b>Focus Field Electronics</b>																		
EL 4 2315	Low Power Design	12	8			4	0				20				6	6		
EL 4 2316	Design of Env. Friendly Circuits and Recycling of Electr.	3	2			1				x	5				3			
EL 5 2317	Optoelectronics	3	2			1				x	5					3		
EL 5 2318	Nanoelectronics	3	2			1				x	5					3		
<b>Focus Field Communication</b>																		
EL 4 2319	Mobile Information Devices	3	2				1			x	5				3			
EL 4 2320	Audio & Speech Processing	3	2				1			x	5				3			
EL 5 2321	Biomedical Electronics	4	2			2				x	5					4		
EL 5 2322	Networks in Industrial Automation	4	1			1	2			x	5					4		
<b>Focus Field Controls</b>																		
EL 4 2002	Numerical Mathematics	4	2			2				x	5				4			
Foreign Language / Free Elective (Modelling and Simulation)																		
EL 5 2903	Controls	4	2			1	1			x	5					4		
Foreign Language / Free Elective (Sensors & Actuator Networks)																		
EL 4 2002	Numerical Mathematics	4	2			2				x	5				4			
<b>Electives</b>																		
EL 7 2019	Scientific Methods (Block or Online)	4	2			2				x	5							4
EL 7 2020	Foreign Language									x	5							
EL 7 2021	Module from any other Bachelor study course HSRW									x	5							

**Explanations / Conditions**

- \* The faculty reserves the right to determine a minimum number of participants for offering a subject in the focus fields / electives, as well as a maximum number of participants. The possibility of obtaining the required number of credit points remains unaffected.
- \*\* A maximum of 5 credits may be earned via an elective from the catalogue of any bachelor's degree programme at Rhine-Waal University of Applied Sciences with the approval of the Examination Board of the Faculty of Technology and Bionics.
- \*\*\* The Faculty of Technology and Bionics reserves the right to amend its catalogue of electives.
- \*\*\*\* Due to time tabling constraints, subjects from different focus fields and electives may be offered concurrently.

**Abbreviations**

- HPW Hours per week (also: Semesterwochenstunden / SWS)
- CP Credit points

Curriculum EL (Dual)		HPW	Type						Examinationform		CP	HPW								
			V	SL	S	Ü	Pra	Pro	Attestation	graded		WS1a	WS1b	SS2a	SS2b	WS3	SS4	WS5	SS6	WS7
<b>1<sup>st</sup> Semester</b>																				
EL 1 2000	Introductory Mathematics	8	5				3					x	x	8	8					
EL 1 2011	Programming	4	2					1	2			x	x	5	4					
EL 1 2300	Introduction to Electrical Engineering	3	2			1						x	x	3	3					
<b>2<sup>nd</sup> Semester</b>																				
EL 2 2001	Applied Mathematics	8	5				3					x	x	7		8				
EL 2 2003	Physics	4	2				1	1				x	x	5	4					
EL 2 2012	Advanced Programming	4	2					2				x	x	5		4				
<b>3<sup>rd</sup> Semester</b>																				
EL 1 2008	Statics and Strength of Materials	4	2				2					x	x	5		4				
EL 1 2013	Business Economics & Project Management	4	3					1				x		5		4				
EL 1 2301	Electrical Engineering I	4	2				1	1				x	x	5		4				
<b>4<sup>th</sup> Semester</b>																				
EL 2 2302	Electrical Engineering II	4	2				1	1				x	x	5		4				
EL 2 2303	Digital Electronics	4	2				1	1				x	x	5		4				
EL 2 2304	Analog Electronics	4	2				1	1				x	x	5		4				
<b>5<sup>th</sup> Semester</b>																				
EL 3 2014	Cross-Cultural Management and Creativity	4	2				2					x		5				4		
EL 3 2306	Microcontrollers	4	2					2				x	x	5				4		
EL 3 2307	Fields and Waves	4	2				2					x	x	5				4		
EL 3 2308	Signal Transmission	4	2				1	1				x	x	5				4		
EL 3 2309	Object-oriented Programming	4	2					2				x	x	5				4		
EL 3 2301	Drives and Power Electronics	4	2				2					x	x	5				4		
<b>6<sup>th</sup> Semester</b>																				
EL 4 2323	Materials and Manufacturing of Electronics	4	3				1					x		5				4		
EL 4 2311	Embedded Systems	4	2					2				x	x	5				4		
EL 4 2310	Signal Processing & Measurement Technology	4	1				1	2				x	x	5				4		
EL 4 2302	System Theory and Controls	4	2				1	1				x	x	5				4		
	Focus Field (see: Catalogue Individual Subjects: Focus Field Subjects)	4												5				4		
	Focus Field Subject 1	4												5				4		
	Focus Field Subject 2	4												5				4		
<b>7<sup>th</sup> Semester</b>																				
EL 5 2015	Group Project	1						2	1			x		5					1	
EL 5 2312	Microelectronic Control Systems	4	2					2	1			x	x	5				4		
EL 5 2313	Model-based Hardware Design	4	2				1	1				x	x	5				4		
EL 5 2314	Practical Electronics	4	2					2				x	x	5				4		
	Focus Field (see: Catalogue Individual Subjects: Focus Field Subjects)	4												5				4		
	Focus Field Subject 3	4												5				4		
	Focus Field Subject 4	4												5				4		
<b>8<sup>th</sup> Semester</b>																				
EL 6 2016	Internship / Semester abroad											x		30						
<b>9<sup>th</sup> Semester</b>																				
EL 7 2017	Thesis												x	12						
EL 7 2018	Colloquium												x	3						
EL 7 2310	Technology and Innovation Management	4	2					2					x	5					4	
EL 7 2312	Entrepreneurship	2							2			x		2					2	
	Elective (see: Catalogue of Individual Subjects: Electives)	3												5					3	
<b>Overview</b>		133	V	SL	S	Ü	Pra	Pro	Attestation	graded	210	15	12	16	12	20	24	21	9	9
	HPW								Examinationform		CP	WS1a	WS1b	SS2a	SS2b	WS3	SS4	WS5	SS6	WS7

Catalogue Individual Subjects EL		HPW	Type						Examinationform		CP	HPW								
			V	SL	S	Ü	Pra	Pro	Attestation	graded		WS1a	WS1b	SS2a	SS2b	WS3	SS4	WS5	SS6	WS7
<b>Focus Field Subjects **/**/**/**/**</b>																				
<b>Focus Field Electronics</b>		12	8				4	0						20					6	6
EL 4 2315	Low Power Design	3	2				1					x		5					3	
EL 4 2316	Design of Env. Friendly Circuits and Recycling of Electr.	3	2				1					x		5				3		
EL 5 2317	Optoelectronics	3	2				1					x		5				3		
EL 5 2318	Nanoelectronics	3	2				1					x		5				3		
<b>Focus Field Communication</b>		14	7				3	4						20					6	8
EL 4 2319	Mobile Information Devices	3	2					1					x	5				3		
EL 4 2320	Audio & Speech Processing	3	2					1					x	5				3		
EL 5 2321	Biomedical Electronics	4	2				2						x	5				4		
EL 5 2322	Networks in Industrial Automation	4	1				1	2					x	5				4		
<b>Focus Field Controls</b>		16	8				6	2						20					8	8
EL 4 2002	Numerical Mathematics	4	2				2						x	5				4		
	Foreign Language / Free Elective (Modelling and Simulation)	4	2				2						x	5				4		
EL 5 2303	Controls	4	2				1	1					x	5				4		
	Foreign Language / Free Elective (Sensors & Actuator Networks)	4	2				1	1					x	5				4		
<b>Electives</b>																				
EL 7 2019	Scientific Methods (Block or Online)	4	2				2					x		5						4
EL 7 2020	Foreign Language												x	5						
EL 7 2021	Module from any other Bachelor study course HSRW											x	x	5						

Explanations / Conditions

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- \*\*\* The Faculty of Technology and Bionics reserves the right to amend its catalogue of electives.
- \*\*\*\* Due to time tabling constraints, subjects from different focus fields and electives may be offered concurrently.

Abbreviations

- HPW Hours per week (also: Semesterwochenstunden / SWS)
- CP Credit points